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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/384,186	08/27/1999	HIROAKI MATSUYAMA	12922	7473

7590

04/24/2002

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EXAMINER

NGUYEN, HOAN C

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/384,186

Applicant(s)

MATSUYAMA, HIROAKI

Examiner

HOAN C. NGUYEN

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9 and 12-41 is/are rejected.
- 7) ☒ Claim(s) 4, 10 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-24 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

2. Claims 28 and 32 are objected to because of the following informalities:

In claim 28, "the counter pixel" should be – counter electrode –

In claim 32, "the counter pixel" should be – counter electrode --

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 5, 6, 8, 9 and 12-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (US6344883B2).

In regard to claims 1, 5, 12-14, 17, 23, 30, 34 and 39, Yamada et al. (Fig. 18, example 8, col. 28 lines 48-65) a multi-domain alignment active-matrix liquid crystal display device comprising

- first and second transparent insulating plates made of glass and arranged to oppose each other as a well-known prior art (Figs 31-32 col. 3 lines 1-20);
- said first plate having disposed thereon a plurality of scanning lines and a plurality of signal lines, thin film transistors provided in the vicinity of intersections between the scanning lines and signal lines, and pixel electrodes connected to the thin-film transistors as a well-known prior art of active matrix LCD (Fig. 35, col. 4, lines 27-30);
- a second plate having a black matrix provided with openings at areas that oppose said pixel electrodes, a color layer and counter electrodes provided so as to oppose said pixel electrodes as well-known art for displaying color with color filter (example 12, Figs. 20-21 and col. 32 lines 34-36) blocking light with black matrix (col. 5 line 38-42);
- a liquid crystal being sandwiched between the opposing first and second plates and being controlled by voltage impressed across said pixel electrodes and said counter electrodes as known art (Fig. 35);
- a wiring layer extending in a direction substantially in agreement with the direction of a transmission axis of a polarizer provided on said first or second plate for high contrast ratio without scattering (col. 2 lines 1-9 as well-known prior art; col. 7, lines 30-38; col. 17 lines 31-63; col. 19 lines 10-39).

wherein

- an orientation layer 90a is provided on each pixel electrode 63 of said first plate 62 via an insulating film (homeotropic alignment layer 68 is insulating layer) as Figs. 18 and 26 shown. The alignment layer 58a in figures 5B-C can be modified into curved surface provided on the pixel electrode 52 of the first plate 32 via an insulating film (a solid dielectric layer 59, col. 15 lines 22-44);
- an orientation layer 90a is formed into a curved surface; and said orientation layer defines a cavity recess or protrusion toward second plate (counter substrate providing with counter electrode) with the convex portions 132 and spacer 135.
- an molecule orientation of the liquid crystal with negative dielectric anisotropy in a direction normal to the curved surface of the orientation layer with homeotropic alignment as Figs. 5A-C and 17,
- columnar spacers 65 are provided between the two opposing plates for regulating a panel gap therebetween.

In regard to claims 6, 24, 29 and 33, Yamada et al. disclose (Figs. 17 and 18) an orientation layer is adapted to orient molecules of the liquid crystal substantially at right angles to the planes of said plates.

In regard to claims 15 and 16, it is obvious that the liquid crystal molecules contiguous to the surface of the columnar spacer are aligned substantially parallel to the surface of said columnar spacer for preventing disturbing a orientation of the liquid crystal molecules.

In regard to claim 2, 8, 9, 18, 25, 28 and 35, Yamada et al. disclose (Figs. 31-32) a known art of a liquid crystal display with columnar spacer has an end portion on one side thereof that is disposed approximately at a center of said orientation layer formed on said first plate for dividing domains of liquid crystal molecules.

In regard to claims 3, 19, 21, 26, 32, 36, 37, and 40, Yamada et al. disclose a liquid crystal display with

- an orientation layer formed on said first plate defines a cavity recessed toward said first plate in a cross section taken along a line normal to said plate for regulating alignment of liquid crystal molecules into multi-domain at the pixel region;
- columnar spacer has a diameter that becomes progressively smaller in the direction of said second plate for preventing orientation disturbance.

In regard to claims 20, 22, 27 and 31, Yamada et al. teach the columnar spacer has a sidewall adapted to provide multi-domain alignment of molecules of the liquid crystal.

In regard to claim 38, Yamada et al. teach (Figs. 20 and 21, example 12, col. 34, lines 31-39) a liquid crystal display with said side wall is adapted to pre-align molecules of the liquid crystal substantially parallel (horizontal alignment) to the sidewall.

In regard to claim 41, Yamada et al. teach (Figs. 5, 15 and 18) the curved or slanted surface is formed into a protrusion with bump 69 or the convex portions 132 and spacer 135.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a multi-domain alignment active-matrix liquid crystal display device as Yamada et al. disclosed with (a) a black matrix, a color layer providing on counter electrode for displaying color, (b) liquid crystal molecules contiguous to the surface of the columnar spacer are aligned substantially parallel to the surface of said columnar spacer for preventing disturbing a orientation of the liquid crystal molecules; (c) columnar spacer has an end portion on one side thereof that is disposed approximately at a center of said orientation layer formed on said first plate for dividing domains of liquid crystal molecules.

2. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (US6344883B2) as applied to claims 5-6 above, and in view of Tsunoda et al. (US4938569).

Tsunoda et al. teach (col. 2, lines 27-34) the orientation layer is formed by oblique vapor deposition of SiO for alignment treatment.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a multi-domain alignment active-matrix liquid crystal display device as Yamada et al. disclosed with the orientation layer formed by oblique vapor deposition of SiO for alignment treatment.

Allowable Subject Matter

3. Claims 4, 10 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

Claim 4, there is no prior art teaches the orientation layer formed on said first plate (wiring substrate) defines a protrusion directed toward said second plate (counter substrate) in a cross section taken along a line normal to said first plate, wherein said columnar spacer has a diameter that becomes progressively larger in the direction toward said second plate on which counter electrode is formed.

Claim 10 and 11, there is no prior art teaches the pixel electrode formed on said first plate defines a cavity recessed toward the first plate (wiring or pixel substrate) in a cross section taken along a line normal to the first plate; and wherein said columnar spacer has a diameter that becomes progressively larger in the direction toward said second plate (counter substrate).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Yamanaka et al. (US5986729A) disclose a multilayer liquid crystal display device with spacer inside the pixel electrode.

Namkamura et al. (US5576860A) disclose a liquid crystal display device with rough surface reflector.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (703) 306-0472. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, SIKES L WILLIAM can be reached on (703) 308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-8178 for regular communications and (703) 308-5841 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

HOAN C. NGUYEN
Examiner
Art Unit 2871

chn
April 10, 2002


William L. Sikes
Supervisory Patent Examiner
Technology Center 2800